

Date : April 06, 2021

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 21C19-PTH12

Customer identification : Tangerine - Brazil - T101082011R

Type : Essential oil

Source : *Citrus reticulata* cv. Tangerine

Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-014  - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.

Analyst : Seydou Ka, M. Sc.

Analysis date : March 29, 2021

Checked and approved by :

Alexis St-Gelais, M. Sc., chimiste 2013-174

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PHYSICOCHEMICAL DATA

Physical aspect: Bright orange liquid

Refractive index: 1.4737 ± 0.0003 (20 °C; method PC-MAT-016)

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
α-Thujene	0.08	Monoterpene
α-Pinene	0.65	Monoterpene
Camphene	0.01	Monoterpene
Sabinene	0.27	Monoterpene
β-Pinene	0.20	Monoterpene
Myrcene	1.75	Monoterpene
α-Phellandrene	0.02	Monoterpene
Octanal	0.22	Aliphatic aldehyde
Δ ³ -Carene	0.05	Monoterpene
α-Terpinene	0.04	Monoterpene
para-Cymene	0.08	Monoterpene
Limonene	91.92	Monoterpene
β-Phellandrene	0.31	Monoterpene
(Z)-β-Ocimene	0.01	Monoterpene
(E)-β-Ocimene	0.05	Monoterpene
γ-Terpinene	1.51	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
Terpinolene	0.08	Monoterpene
trans-Sabinene hydrate	tr	Monoterpenic alcohol
Linalool	0.37	Monoterpenic alcohol
Nonanal	0.04	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
cis-Limonene oxide	0.02	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
trans-Limonene oxide	0.02	Monoterpenic ether
Citronellal	0.05	Monoterpenic aldehyde
Terpinen-4-ol	0.01	Monoterpenic alcohol
α-Terpineol	0.05	Monoterpenic alcohol
cis-Piperitol	tr	Monoterpenic alcohol
Decanal	0.16	Aliphatic aldehyde
Octyl acetate	0.01	Aliphatic ester
trans-Carveol	0.01	Monoterpenic alcohol
cis-Carveol	tr	Monoterpenic alcohol
Nerol	0.01	Monoterpenic alcohol
Citronellol	0.03	Monoterpenic alcohol
Thymol methyl ether	0.03	Monoterpenic ether
Carvone	0.01	Monoterpenic ketone
Neral	0.04	Monoterpenic aldehyde
Geraniol	0.01	Monoterpenic alcohol
(2E)-Decenal	0.01	Aliphatic aldehyde
Geranial	0.04	Monoterpenic aldehyde
Unknown	0.01	Oxygenated monoterpene
Limonen-10-ol	0.01	Monoterpenic alcohol
(2E,4E)-Decadienal	0.01	Aliphatic aldehyde

Neryl acetate	0.01	Monoterpenic ester
α -Copaene	0.01	Sesquiterpene
Geranyl acetate	0.02	Monoterpenic ester
β -Elemene	0.02	Sesquiterpene
Dodecanal	0.04	Aliphatic aldehyde
β -Caryophyllene	0.02	Sesquiterpene
β -Copaene	0.01	Sesquiterpene
α -Humulene	0.01	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.01	Sesquiterpene
Germacrene D	0.03	Sesquiterpene
Valencene	0.05	Sesquiterpene
α -Muurolene	0.01	Sesquiterpene
γ -Cadinene	0.02	Sesquiterpene
δ -Cadinene	0.02	Sesquiterpene
α -Elemol	0.01	Sesquiterpenic alcohol
Germacrene D-4-ol	0.01	Sesquiterpenic alcohol
β -Sinensal	0.02	Sesquiterpenic aldehyde
α -Sinensal	0.04	Sesquiterpenic aldehyde
Myristic acid	0.02	Aliphatic acid
Palmitic acid	0.07	Aliphatic acid
Linoleic acid	0.05	Aliphatic acid
Oleic acid	0.05	Aliphatic acid
Stearic acid	0.03	Aliphatic acid
Tangeretin	0.09	Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.03	Flavonoid
Nobiletin	0.06	Flavonoid
Consolidated total	98.98%	

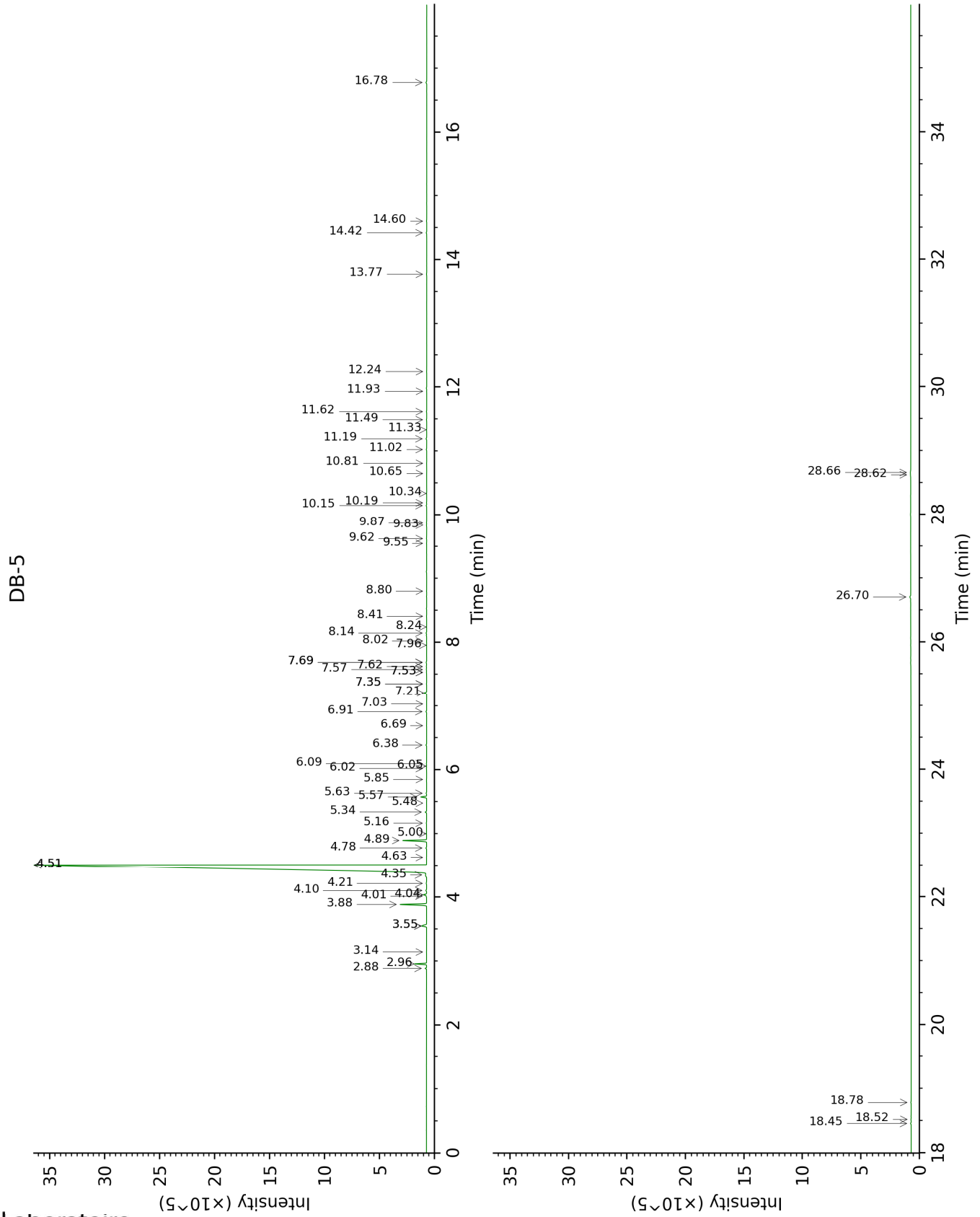
tr: The compound has been detected below 0.005% of total signal.

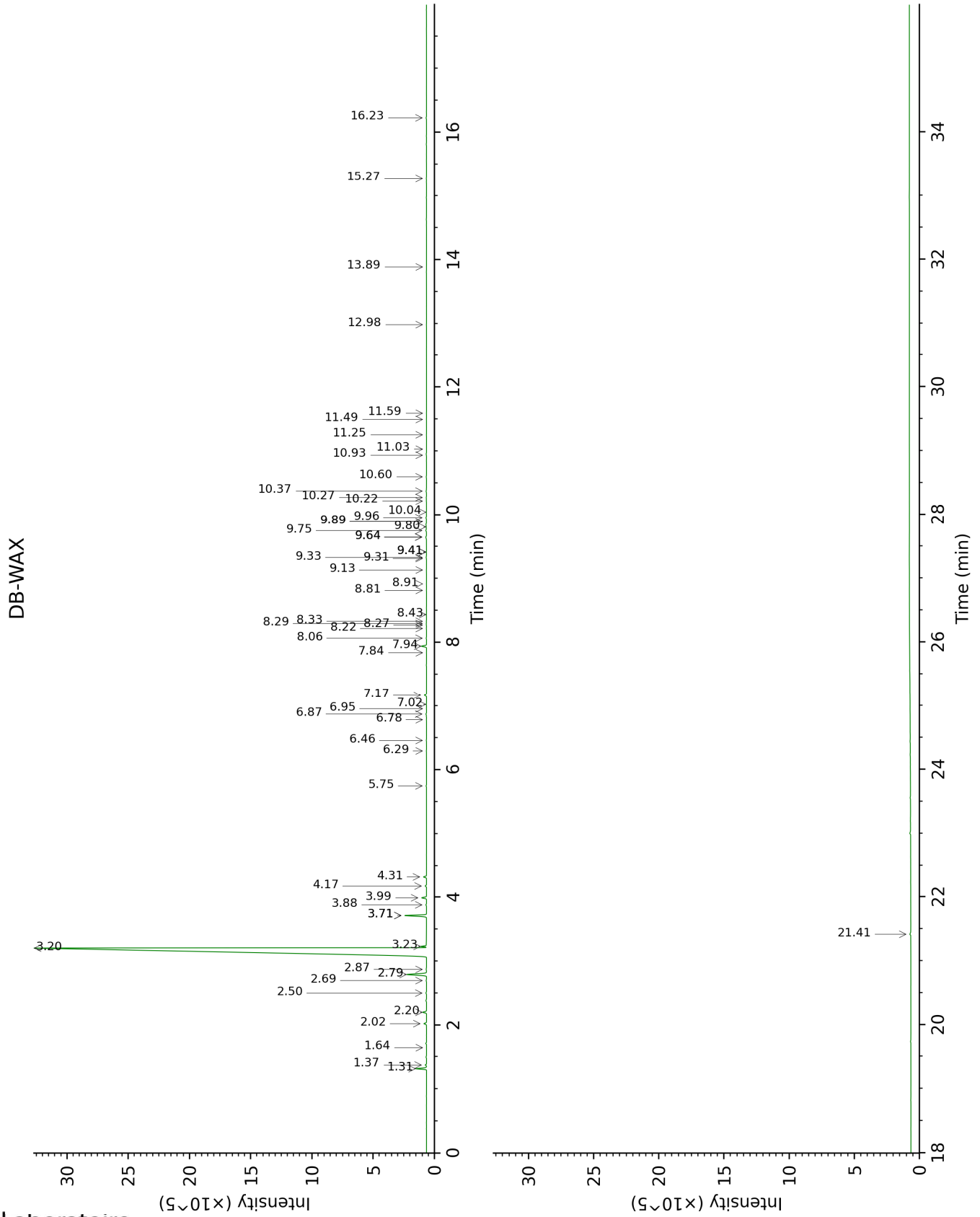
Note: no correction factor was applied

About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm is set to prioritize data from the most standard DB-5 column, and smallest values so as to avoid overestimating individual content. This process is semi-automatic. Advanced users are invited to consult the "Full analysis data" table after the chromatograms in this report to access the full untreated data and perform their own calculations if needed.

Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

This page was intentionally left blank. The following pages present the complete data of the analysis.





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
α -Thujene	2.88	927	0.08	1.37	1002	0.08
α -Pinene	2.96	931	0.65	1.31	993	0.70
Camphene	3.14	944	0.01	1.64	1028	0.01
Sabinene	3.55*	971	0.46	2.20	1085	0.27
β -Pinene	3.55*	971	[0.46]	2.02	1067	0.20
Myrcene	3.88	994	1.75	2.79	1135	1.72
α -Phellandrene	4.01	1003	0.02	2.70	1128	0.04
Octanal	4.04	1004	0.22	4.31	1251	0.21
Δ 3-Carene	4.10	1008	0.05	2.50	1112	0.06
α -Terpinene	4.21	1016	0.04	2.87	1141	0.04
para-Cymene	4.35	1024	0.08	3.99	1227	0.34
Limonene	4.51*	1034	92.82	3.20	1168	91.92
β -Phellandrene	4.51*	1034	[92.82]	3.23	1170	0.31
(Z)- β -Ocimene	4.63	1042	0.01	3.71*	1207	1.51
(E)- β -Ocimene	4.78	1051	0.05	3.88	1219	0.05
γ -Terpinene	4.89	1059	1.51	3.71*	1207	[1.51]
cis-Sabinene hydrate	5.00	1065	0.01	6.78	1430	0.01
Octanol	5.16	1076	0.02	8.06	1528	0.03
Terpinolene	5.34	1087	0.08	4.17	1240	0.09
trans-Sabinene hydrate	5.48	1096	tr	7.84	1510	0.01
Linalool	5.57	1102	0.37	7.94	1518	0.37
Nonanal	5.63	1106	0.04	5.75	1355	0.03
trans-para-Mentha-2,8-dien-1-ol	5.85	1119	0.01	8.81	1586	0.01
cis-Limonene oxide	6.02	1130	0.02	6.29	1394	0.02
cis-para-Mentha-2,8-dien-1-ol	6.06	1133	0.01	9.31	1626	0.01
trans-Limonene oxide	6.10	1135	0.02	6.46	1406	0.02
Citronellal	6.38	1154	0.05	6.87	1437	0.05
Terpinen-4-ol	6.69	1173	0.01	8.43	1557	0.01
α -Terpineol	6.91	1188	0.05	9.64*	1654	0.09
cis-Piperitol	7.03	1195	tr	9.41*	1634	0.01
Decanal	7.21	1207	0.16	7.17	1460	0.16
Octyl acetate	7.35*	1216	0.01	6.95	1443	0.01
trans-Carveol	7.35*	1216	[0.01]	11.25	1789	0.01
cis-Carveol	7.53*	1229	0.02	11.59	1818	tr
Nerol	7.53*	1229	[0.02]	10.93	1762	0.01
Citronellol	7.57	1232	0.03	10.60	1733	0.03
Thymol methyl ether	7.62	1235	0.03	8.33	1548	0.02
Carvone	7.69*	1239	0.04	9.89*	1674	0.02
Neral	7.69*	1239	[0.04]	9.33	1627	0.04
Geraniol	7.96	1257	0.01	11.49	1809	0.01
(2E)-Decenal	8.02	1262	0.01	8.91	1594	0.01
Geranial	8.14	1270	0.04	9.96	1679	0.05
Unknown [m/z 95, 67 (45), 41 (42), 110 (42), 43 (41), 59 (36)]	8.24	1276	0.01			

Limonen-10-ol	8.41	1288	0.01	12.98	1944	0.01
(2E,4E)-Decadienal	8.80	1314	0.01	11.03	1770	0.01
Neryl acetate	9.55	1367	0.01	10.04	1686	0.02
α -Copaene	9.62	1373	0.01	7.02	1449	0.02
Geranyl acetate	9.83	1388	0.02	10.37	1714	0.05
β -Elemene	9.87	1390	0.02	8.27	1544	0.02
Dodecanal	10.15	1410	0.04	9.80	1667	0.04
β -Caryophyllene	10.19	1413	0.02	8.29	1546	0.02
β -Copaene	10.34	1424	0.01	8.22	1540	0.02
α -Humulene	10.65	1448	0.01	9.13	1611	0.01
(E)- β -Farnesene	10.81	1459	0.01	9.41*	1634	[0.01]
Germacrene D	11.02	1476	0.03	9.64*	1654	[0.09]
Valencene	11.19	1488	0.05	9.75	1662	0.07
α -Muurolene	11.33	1499	0.01	9.89*	1674	[0.02]
γ -Cadinene	11.49	1511	0.02	10.22	1700	0.02
δ -Cadinene	11.62	1521	0.02	10.27	1705	0.03
α -Elemol	11.93	1546	0.01	13.89	2029	tr
Germacrene D-4-ol	12.24	1570	0.01			
β -Sinensal	13.77	1695	0.02	15.27	2166	0.01
α -Sinensal	14.42	1751	0.04	16.23	2264	0.03
Myristic acid	14.60	1767	0.02			
Palmitic acid	16.78	1966	0.07	21.41	2867	0.08
Linoleic acid	18.45	2132	0.05			
Oleic acid	18.52	2139	0.05			
Stearic acid	18.78	2166	0.03			
Tangeretin	26.70	3140	0.09			
3,3',4',5,6,7,8- Heptamethoxyflavone	28.62	3326	0.03			
Nobiletin	28.66	3329	0.06			
Total identified		99.55%			99.01%	
Total reported		99.56%			99.01%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total

†: Peaks apexes were resolved, but peaks overlapped and were summed for analysis

tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied
R.T.: Retention time (minutes)
R.I.: Retention index